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THE ECONOMIC POSSIBILITIES OF CONSERVATION

SUMMARY

Conservation distinguished from the conservation movement, 497. — The relation between utilization and exhaustion, 499. — Economic conditions which determine the rate of exhaustion when resources are controlled by individuals, 503. — The connection between the conditions which result in economical utilization by individuals and those determining the aggregate depletion of natural resources, 509. — The costs of conservation, 512. — The absolute limits of conservation, 515. — Conclusions as to conservation policy, 518.

I

It is not safe, without some preliminary definition, to attempt a scientific consideration of a concept which is chiefly a product of popular discussion. In America the idea of conservation has developed from a general recognition of rapidly increasing scarcity of natural resources. The westward expansion of the cotton and wheat industries, with the attendant exploitative methods of production, has been checked by the attainment of the ultimate frontier. The nation has reached the point where it is possible to make a rough inventory of its mineral resources. Scientific estimates have caused a rude awakening from the dreams of vast undiscovered treasures which influenced the national outlook until recent times. The popularity of the idea of conservation, however, has resulted in the extension of the idea and terminology of the conservation movement, to many new fields; and the essential issues have been beclouded by the multiplication of phrases such as "conservation of the home," "conservation of labor," and "conservation of health."

It is desirable to confine the idea of conservation to its original application to natural resources. Even in this sense the concept as developed in the conservation movement comprises several distinct purposes, which are not clearly separated in the popular mind. In the first place, it expresses a demand for a fair distribution of the natural resources not yet alienated. Of such a character is the recent popular demand that the Alaskan coal fields be not allowed to fall into the clutches of the syndicates. Somewhat akin to this are the more radical demands for redistribution of the natural resources already alienated. Much of the popularity of the movement has probably been due to the emphasis upon the problem of distribution.

Another phase of the movement is purely educational. The habit of exploitation, once fixed, is so strong that individuals will frequently continue their wasteful practices after they become uneconomic even from the point of view of individual self-interest. This aspect of conservation leads to the promotion and encouragement of scientific research and invention. Furthermore, it involves an educational policy that will result in widespread knowledge of those methods of economic utilization of natural resources which are consistent with individual self-interest. Altho it is difficult to estimate the amount of conservation that may be effected by such processes of enlightenment, it is certain that a large amount of inertia needs to be overcome. Self-interest is not always awake to its opportunities. The English farmer pursued his thousand-year-old custom of bare-fallowing long after the superiority of turnips as a fallow-crop had been demonstrated.

Neither of these aspects of the conservation movement involves problems which are peculiarly novel in their scope, however great their intrinsic difficulties. The real heart of the conservation problem presents an issue which taxes the resources of economic theory to the utmost. This issue is the problem of adjusting the conflict between the interest of present and future. It is the purpose of this paper to estimate the extent of this conflict of interest and to point out the economic possibilities of conservation. This is all the more important in view of the fact that in America the possibilities of conservation have been considered largely from the standpoint of natural science, while the economic limitations have been but little appreciated.

It is first necessary to determine the relation between the utilization of natural resources and their exhaustion. If utilization did not result in exhaustion, the problem of conservation, as it was stated above, obviously would not exist. Accordingly, natural resources may be classified as follows: —

I. Resources which exist in such abundance that there is no apparent necessity for economy, either in present or future. For instance, water in some localities.

II. Resources which will probably become scarce in the remote future, altho so abundant as to have no market value in the present. For instance, building stone and sand in some localities.

III. Resources which have a present scarcity, —

    1. Not exhaustible through normal use: water-powers.
    2. Necessarily exhausted through use, and non-restorable after exhaustion: mineral deposits.

3. Necessarily exhausted through use, but restorable: forests, fish.
4. Exhaustible in a given locality but restorable through the employment of other resources of a different kind or of similar resources in different locations: agricultural land.[1]

The relation of utilization and exhaustion thus is varied. Water-power is not depleted by rational use, and, strictly speaking, methods of conservation are unnecessary to prevent its being wasted. The use of water-power involves no greater waste of the actual power than does the non-use. There is no necessary conflict between present and future. It is true that other kinds of uses of the water, for instance, irrigation, may impair the stream-flow and lessen the power; and the denudation of forests may have a similar effect. The former, however, involves merely a choice between two methods of present utilization; the latter is connected with the problem of conserving forests. In the case of water-powers the question is primarily one of most effective present use.

In some respects the conservation of resources such as forests, fish, and game does not involve the more difficult and fundamental phases of conservation. A forest destroyed can be restored. After the original stock is exhausted, the problem becomes one of economical production and consumption. It differs from the problem of the production and consumption of wheat chiefly in the fact that the replacement of forests requires a long period of time. The conservation of forests already in existence is a question of consumption. If there were no means of increasing the supply, the problem would be identical in character with that of conserving minerals. It would be necessary to make a definite choice between the present use and future uses. The possibility of reproduction mitigates, if it does not entirely remove, the conflict between present and future interests. The reproduction of forests demands a willingness to undergo a long production process for the sake of a future gain. In some instances the future gain may outbalance the present sacrifice involved in the costs of reproduction; but this is not always the case. The conservation of forests may impose a heavy burden upon present generations, for the sake of future generations.

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[1] In terminology the above classification resembles one proposed some years ago by Professor B. E. Fernow; see his Economics of Forestry (p. 10). In detail, however, the classifications differ widely.

The above classification is not entirely logical. It is serviceable, nevertheless, in affording convenient pigeon-holes by means of which a preliminary order may be achieved in approaching the difficult problems involved.

Minerals afford a tolerably clear-cut type of resources which are absolutely limited in supply and non-restorable. It is necessary to make a definite choice between present and future. Normally, when once used, the supply is exhausted practically for all time. The particular mine is poorer by reason of the extraction of its contents; and there is no reason for restoring to it from other sources the elements removed in the process of production. Not only is the particular mine poorer, but the entire potential supply of minerals is reduced by this utilization. This is absolutely true in the case of coal, petroleum, and natural gas. It is relatively true of most metals, such as iron, copper, and gold. There is some possibility of using iron and copper again and again for different purposes; and after it is mined, gold becomes a part of a permanent visible supply, which is but slowly reduced by abrasion and loss. Yet the most serious phases of the conservation problem grow out of the fact that some of the most important elements, such as coal, petroleum, and iron, are being rapidly and completely used up without hope of replacement.[1]

When land is employed in agriculture, the relation between utilization and exhaustion is not so clear and definite as it is in the case of mineral land. The properties of land which are of importance in agriculture include such varied elements as the different kinds of nutritive salts, certain bacteriological conditions, the physical properties of the soil, rainfall and other climatic conditions, the prevalent direction of the wind, and the character of drainage. Some of these conditions, such as climate and slope, are practically inexhaustible. The chemical properties of the soil are probably exhaustible by utilization; but many of these properties exist in so great abundance as to make their removal by use a matter of little significance. Even those properties which are scarce and exhaustible, such as potash and phosphorous, may be restored by carrying these elements from other localities. And altho this does not result in absolute conservation, — since the total world supply is to that extent depleted, — it may represent conservation from the standpoint of the locality in which the restoration is effected. Some agricultural experts maintain that through rotation of crops, animal husbandry, and other scientific methods, it is possible to prevent the impairment of soil fertility without relying on elements brought from other localities. From a physical standpoint agricultural land is not necessarily exhaustible.

It is of the first importance, however, to distinguish between the physical and the economic possibility of conservation in agriculture. If the soil elements in a given location are sufficiently valuable, the expense of replacement will be incurred; otherwise, it may prove more profitable to use them up without replacement. On the frontier, low land values have rendered exploitation a very profitable mode of utilization. Moreover a system of utilization capable of maintaining the soil elements unimpaired, by means of rotation of crops or by other scientific methods, in many cases may not satisfy the criterion of maximum profitableness. For instance, there may be one crop which, if it could be produced year after year without diminution of product, would yield a larger return than other crops in the rotation. The difference in productivity between this favored crop and the other crops necessary to maintain the soil fertility may properly be regarded either as an expense necessary to the production of the favored crop or as an expense chargeable to depreciation. In either case the soil elements have an exhaustion value similar to that of the coal removed from the mine. In short, it is not necessarily true that the method of utilization which results in conservation is the method which results in maximum profits.

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[1] See Van Hise, The Conservation of Natural Resources, pp. 16–102.

II

In this country the owner of natural objects has practically complete control so far as utilization is concerned. There has been, as yet, but slight development of legal machinery for limiting his right of use and abuse. Most of our natural resources are already subject to the limitations of individual property rights. Is private property in natural objects favorable or unfavorable to the realization of the ideals of the conservationist? This depends upon the extent to which the individual will find it profitable to employ methods of conservation in the utilization of the natural resources under his control. It has already been suggested that conservation may be or may not be a profitable policy for the individual in utilizing the natural resources in his possession. It is essential, therefore, to inquire what are the conditions which, in the case of the individual, determine the profitableness of a conservation policy.

At the outset, it is essential to distinguish conservation and accumulation. Motives of accumulation have little direct influence on the motives which determine the methods of utilizing private property. Accumulation has become a generalized process — a process which, by reason of the system of division of labor and exchange, demands not the laying by of a concrete production good for future use but the accumulation of a fund of generalized purchasing power. A farmer, for instance, does not necessarily increase his level of accumulation by preserving intact the actual farm which he possesses. His chief object is to derive from the farm the largest possible net income, and from this income to effect whatever accumulation he desires. When land is cheap, the farmer may be able to acquire, and therefore accumulate, a much larger quantity of wealth by exploiting the soil than by the more laborious and less profitable process of conserving it.

Whether or not the individual will pursue a policy of exploitation or one of conservation, depends on a number of conditions, the most important of which are the rate of interest, the law of diminishing productivity, and the value of the natural resources under the individual's control.

The influence of the rate of interest may be illustrated by the motives which govern the owner of a coal mine in the utilization of his property. It may be assumed that a portion of the content of the mine will yield a surplus above the expenses of removal under the most favorable conditions of appropriation. This portion of the content of the mine constitutes a valuable property, which the owner is anxious to enjoy. Were it possible to remove all of this content in the present as cheaply as over a period of time, the owner would most certainly do so. This is true because the proceeds from the sale of the product may be put out at interest, whereas the mineral yields no interest so long as it remains unsold. It is assumed, of course, that no changes in the price of the product are anticipated.

The owner is prevented, however, from the immediate appropriation of the entire valuable content because the removal of the product is subject to the law of diminishing productivity. After a certain rate of removal is achieved, an increase in that rate results in a smaller return per unit of expense. The additional mineral is removed at a higher expense per ton, and the average net return per ton declines. By postponing the extraction of this additional coal until some future period, the owner of the mine can remove the entire content at a minimum expense.

Hence the owner of the mine is confronted by a dilemma. If he postpones the appropriation of the coal, he loses the interest on the invested returns from his product. If on the other hand he attempts to appropriate the entire quantity of mineral, the expense of appropriation becomes so great that the surplus per ton is greatly diminished, if not entirely destroyed. In short, there is a continual conflict between the motives of future appropriation and the motives of present appropriation.

The rate of extraction of the coal which will be most profitable to the owner is necessarily a rate between the two extremes which have just been explained. If the interest rate is high, the postponement of removal until a future period becomes less profitable than would be the case under a lower rate of interest. The greater amount of interest which may be secured from the realized product more than balances the loss from diminishing returns through an increase in the rate of present removal. Thus the general effect of a high interest rate, other things being equal, is rapid exploitation; whereas a lower interest rate makes a policy of conservation more profitable to the owner.

It follows that if the mineral capable of yielding a net return under the most favorable conditions of extraction is sufficiently limited in quantity, the owner will not find it to his interest to proceed at so rapid a rate of utilization as would be profitable according to the implications of the Ricardian theory of rent. For this theory implies that the process of appropriation at any time will continue so long as the removal of an additional ton will yield a return equal to the necessary expense. If, however, the present value of the net return which the same coal will yield when its removal is postponed until a future time, is more than zero, the owner of the mine will find it profitable to stop short of the point where present returns just equal expenses. The more definitely limited the coal, and the lower the interest rate, the larger the surplus on the intensive margin. In so far, then, as the individual owner of limited natural resources recognizes their exhaustibility, his best interest dictates the practice of a greater amount of conservation than is implied in the Ricardian theory of rent. This tendency, however, is definitely checked by the counter-tendency to discount the future, in proportion to the height of the interest rate.

The market value of the natural resource influences the rate of utilization in several ways. In the first place, the rise of value increases the amount of land that may be profitably utilized. It becomes profitable to farm new areas, to sink shafts in mineral deposits which it would not have been profitable to mine under the lower level of prices, and to seek lower levels in the old shafts. In short, the result of the increase in value is to increase rapidity of utilization by stimulating the appropriation of resources hitherto not subject to use, thereby intensifying the drain upon the supply of natural resources.

The second result of the increase in value is to encourage a more intensive utilization of the resources formerly employed. This is the " law of substitution." More labor and capital goods are employed, and less land, in proportion to results. Does this mean conservation or more rapid utilization ? There has been a widespread belief that an intensive use of land is a conservative use and that high land values will result in a cessation of soil mining. In general, however, a more intensive use implies merely the association of a relatively large amount of labor and capital with a given *surface* of land. A larger amount of labor and capital associated with a given surface may mean a more rapid utilization of the *content* of the land than under more extensive methods. It may mean deeper plowing, more frequent cultivation, larger harvests, more rapid exhaustion. Often this is true even of so-called scientific farming; as, for instance, seed selection, which may result in more bountiful harvests and probably a more rapid exhaustion. Even the application of manures has the effect of a stimulant, releasing more rapidly some of the less abundant stores of fertility.

There are several reasons, however, which justify the view that utilization will tend to be exploitative when land is cheap, and conservative when it is dear. In the first place, conservation frequently requires a present expenditure in order to prevent the waste or deterioration of the residuum of resources not immediately needed. For instance, it may be possible to retard the erosion of the soil by present expenditures in terracing and drainage. The economic problem involved is the balancing of present expenditures against future benefits. A similar problem is encountered in forest culture. The same action may affect a number of future periods, some near in point of time and some remote. The sum of the successive future benefits — each benefit having been discounted at the prevailing rate of discount on the future — represents the total benefit to be balanced against present expenditure. The more valuable the natural resource, the more likely is the owner to pursue a policy which will prevent the waste of the land by utilization or otherwise. Moreover the rate of discount on the future plays an influential role in this phase of conservation as in others; for the higher the rate, the smaller is the present value of the expected benefits to be balanced against the requisite present expense.

In the second place, high value of a natural object is favorable to conservation because a tendency results for other less valuable resources to be substituted in place of it. Had our government followed the policy of carefully restricting the alienation of mineral resources so that the value of coal might be higher, the water-powers of America would probably have been fully utilized a generation ago.

The effect, therefore, of the rise in the value of natural resources is two-fold: first, to increase the quantity of resources that are brought under utilization; and second to create motives for economizing those already in use. In the one direction the influence is favorable to conservation; in the other direction, unfavorable.

III

If we widen our point of view and consider utilization and conservation from the standpoint of society, the explanation of the paradox just noted will be seen to arise from the conditions which determine market value. If the potential supply of the natural object is fixed, the value is a resultant of social demand. On the quantitative side, social demand depends upon the means of utilization. In the last analysis human labor constitutes the effective means of utilizing natural resources. It is true we must include not only living labor but also " dead labor," as embodied in capital goods. Moreover, much depends on the efficiency of the labor and the scientific direction which it receives. On the quantitative side the number of laborers, the duration of labor, and the efficiency of labor constitute the essential factors in social demand.

Much, however, depends upon the character of wants. If men desire chiefly commodities which require a large amount of natural resources for their satisfaction, the social demand for the objects of nature will be correspondingly great. Moreover, human wants may be diverted from objects which require very scarce resources to those objects which are the products of more abundant resources.

If through any of the above causes social demand increases, the existing supply of natural resources will acquire a greater importance, and utilization will increase at a more rapid pace. Therefore, in spite of the fact that the increase of social demand results in higher values of natural resources, and consequently more economical methods of use, a greater aggregate depletion of those resources may result. One hundred and fifty years ago the prevailing methods of farming were wasteful in the extreme; but the aggregate drain upon our natural resources was as nothing compared to the present annual depletion, even tho higher land values may now result in more careful methods of use. Then we were carelessly scratching the soil on the Atlantic seaboard; now we are digging deep into the fertility of a continent.

Since an increase in social demand results in a great increase in the aggregate utilization of natural resources, it follows that conservation may be effected by measures whose result is a decrease in social demand. Such a decrease may be effected by the restriction of population or by changes in the character of wants. Alterations of these kinds, however, are exceedingly difficult to bring about by positive social action.

The preceding analysis has shown that even if social demand be decreased, without a corresponding decrease in the supply of natural resources, the values of such resources will be low and methods of utilization will become careless and wasteful in the extreme. Hence, in order both to reduce the aggregate exhaustion of natural resources and to bring about careful methods of utilization, it is essential to reduce the available supply of such resources as well as to curtail the social demand.

In considering the conservation of the natural resources of a nation, it is important to suggest that much depends on the distribution of social demand with reference to the supply of natural resources. At all times social demand is more concentrated in some parts of the nation than in others. Population is not evenly distributed, and values of natural resources are unequal in different sections. Hence, with a given general relation between demand and supply there may be great waste in methods of utilization in the less thickly peopled regions, while conservation methods may be employed in the regions of dense population. This suggests what might have been a partial solution of the conservation problem had our fathers cared to provide a solution. The frontier has been the line of minimum social demand for natural resources in proportion to the supply and, therefore, the line where the most wasteful methods of utilization have been followed. Even now it is in our outlying districts, where natural resources are abundant and cheap, that the greatest waste occurs. Had our fathers made the frontier a dead-line which might not be extended until sufficient social demand existed to create high land values at once, a maximum economy of utilization might have resulted. Even now that the frontier has disappeared, the unequal pressure of social demand in the less densely populated regions requires such a policy as an effective means of promoting conservation. The frontier has been as much responsible for high interest rates as for low land values, because of the high marginal productivity of capital; and this is true today in outlying regions. Here is another reason why exploitative methods prevail in such regions.

The difficulty of accomplishing such a policy as has been indicated is obvious. The historian well knows the tremendous political forces that would have prevented its being carried out, even had its importance been appreciated. Our government has reflected the powerful social pressure for immediate utilization. Let anyone who is optimistic as to the reliance that may be placed in the ethical spirit of society when called on to deny itself the enjoyment of a vast and virgin domain consider what would have been the probability in the period from 1830 to 1850 of persuading the American people to support a policy of restriction of the alienation of the public domain in order to conserve it for future generations.

Assuming the social demand fixed, and leaving out of account improvements in technique, conservation can be effected only by bringing about less wasteful methods of utilization. This may be accomplished directly by compelling individuals to employ methods that will result in conservation; or it may be accomplished indirectly by limiting the supply of natural resources and creating the inducement to conservation which arises from high value of such resources. If the landowner is already employing methods of utilization most consistent with individual profit, either of these policies is likely to involve a heavier expense per unit of result. If by direct action the individual is compelled to remove his coal less wastefully, or to employ more careful methods of preserving his soil, his expenses of production will be increased; and these extra expenses will presumably be transferred to the consumer. If on the other hand it is attempted to accomplish the same results indirectly by so restricting the supply of natural resources in the hands of producers that it will be to their interest to use intensive methods of operation, it is no less true that the expense of producing the product will probably be increased. Society must bear the burden. If mine owners are required to substitute wooden supports for the columns of ore which are now employed to support the roofs of their mines, coal that would otherwise be lost may be saved for the future; but coal for present use will likely be more expensive. If farmers are compelled to restore fertility to the soil or to practise diversified agriculture, wheat may not be so cheap as when produced on the frontier by the wasteful methods of the one-crop system.

The process of substitution which results from high values is not merely a substitution of cheap land for dear land; it may also involve a substitution of labor for land. This is true of many of the measures which the conservationists suggest. It is probably true in the case of scientific forestry in the United States. The assertion is sometimes made that it is impossible to rely on individual enterprise to carry out a consistent policy of forest culture because the lifetime of the individual is too short. The disinclination of the individual to engage in forest culture is not thus sufficiently explained. If it were apparent to our large capitalists that the present value of the future return to be derived from the forest when mature would be enough to repay the expense plus a legitimate profit (allowance being made for risk), the remoteness of the return, as compared with the length of human life, would not constitute a serious discouragement. At any given time, the investment would have a capital value which might be turned into cash. It would be possible for large corporations to undertake such enterprise, and for the individual investor to realize on his securities at any time, as in the case of any other business. One of the chief reasons why this situation fails to develop is that normally the remote return has in fact too small a present value to justify the necessary expense and risk. It is important, therefore, to realize that while many considerations justify the government in making the necessary provision, the policy may represent an increased burden on the present generation for the benefit of a future generation.

In short, conservation, as distinguished from mere education in rational methods of use, is generally a policy which increases the burden of the present; assuming of course that there is no change in the quality or quantity of social demand. This conclusion, like so many others in economics, rests on the assumption that the forces of competition which cause individuals to reduce expenses of production to the lowest limits also cause those minimum expenses to correspond to minimum social costs of production. Economists realize that this correspondence is not complete. There is a lack of correlation in individual expense and social cost because of the considerable friction in the operation of competitive forces. Nevertheless the correspondence probably is sufficiently close to justify the conclusion that methods of conservation are likely to increase the economic burden in the present.

The absolute limits of conservation are now apparent. Society is confronted by the same choice that accumulation imposes on the individual: a choice between present satisfaction and future satisfaction. Moreover, conservation requires that individuals lessen their consumption today in order that other individuals may enjoy the results of their abstinence. Hence, in so far as it involves the saving for the enjoyment of other generations what we might use for ourselves, it constitutes a type of ethical requirement which is upon a higher level than any that has heretofore existed, — an ethical requirement entirely novel in its scope. The ethical field is to be widened to include unborn generations; not only those which will appear in the immediate future but also those which are yet enshrouded in a future limited only by the uncertain period of human life upon the earth. Few individuals have achieved an ethical level sufficiently exalted to induce them to curtail present enjoyment for the sake of shadowy generations yet to come. Let any policy be imposed at the present day the consequences of which are recognized by the general public as resulting in serious curtailment of present enjoyments in the interest of a most distant future; and one would not have to be a cynic to predict an uprising of the individual against the organs of social control.

The primary problem of conservation, therefore, expressed in economic language, is the determination of the proper rate of discount on the future with respect to the utilization of our natural resources. Some discount of the future, there must be. If society reduced the discount on the future to zero, the period of utilization would be increased to infinity; and therefore, the amount of present use would become infinitesimal. Conservation as a single principle of action involves the equal importance of future wants and present wants. It requires that the want of the infinitely distant future shall be as important as the want of the immediate present. Conservation as a single principle of action is reduced to an absurdity.

Where is the proper balance between utilization and conservation? Philosophically considered, the question cannot be answered with finality without such a definite comprehension of the purpose of human existence as has not been vouchsafed the race. In the absence of more infallible foundations we shall doubtless lean on the " crutch of common sense." Certainly, most of us would agree that utilization must not be so restricted as either to impair the treasured results of past progress or to handicap seriously the rate of progress in the future. A philosophical historian might well ask what would have been the outcome had the American land policy from the earliest time been a conservative one. Had the original policy inaugurated by the London Company, of charging twelve pounds ten shillings per hundred acres, been continued, our frontier might yet be east of the Mississippi River; and almost certainly the rapidity of our national progress would have been materially less. That the vast material and intellectual progress which has coincided with the development of the New World would have been retarded cannot be confidently asserted; but it appears extremely probable.

Altho there is a close connection between the utilization of natural resources and the rapidity of social progress, the connection is by no means so complete as at first appears. Exploitation results in maximum production under certain conditions, but maximum production does not necessarily mean progress. A bad system of distribution may produce a degraded proletariat dominated by an equally degraded plutocracy. Maximum production may be accompanied by a manner of life which is not consistent with the highest social development. A bad distributive system may demand more rapid production, and therefore a more rapid utilization of the resources of society, without bringing to the great majority of our people the satisfactions which rational and legitimate present needs appear to justify. A vast amount of consumption is neither based on welfare, nor on enjoyment; it is solely dictated by convention. The enormous waste of coal required for the electrical advertising in our great cities is illustrative of this exploitative consumption. As Professor H. J. Davenport has expressed it, "Every great White Way in every American city is nightly one more chemical orgy of waste, a crime of competitive advertising for which some day thousands of individuals must shiver for months."[1] The necessities of conservation may compel the economist to enlarge his field so as to apply the test of economy as one of the criteria for the justification of wants.

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[1] Papers and Discussions of the Twenty-Third Annual Meeting of the American Economic Association, December, 1910, p. 330.

A few broad conclusions with respect to policy follow from the above discussion. In the first place, conservation appears to be consistent with the continuance of the existing socio-economic order. Under proper social conditions the utilization of natural resources may be entrusted, to a large extent, to the individual property owner. However, unless social conditions are favorable, it is folly to expect methods of conservation to be employed by the individual. Merely urging the landowner or entrepreneur that he ought to conserve his land will not convince him of this sacred duty when it means business ruin and elimination from the competitive race. Short sighted travellers from Europe, for generations, have criticised the exploitative methods of the American frontier farmer and have urged upon him the careful soil-preserving methods of the old world. The remonstrances of these critics have been unheeded, not because the frontier farmer was unintelligent, but because of cheap land and high interest rates. It would be equally futile to try to regulate at every point the methods of utilization. In agriculture, were the motives of exploitation sufficiently powerful, a standing army would be inadequate.

The line of least resistance appears to be in the creation of proper social conditions which will provide the motives of conservation. A most important social condition is the interest rate. In all cases the interest rate must be rendered as low as possible. To this end adequate credit agencies should be provided for those who own and operate natural resources. Over a short period, however, government can control the interest rate less than it can control the value of natural resources. This is the second great instrument for controlling, by indirect means, the individual who utilizes natural resources. Conservation requires the creation of high values; but this must be accomplished through the socialization of those resources which are not used, and of those which, on account of their relative abundance, are being used in an exploitative way. In this manner values may be kept sufficiently high to cause the individual to accomplish the maximum result with the minimum of waste.

The superiority of the state in its ability to borrow at a low rate of interest may dictate, in some directions, a policy of public utilization. An additional reason exists when the policy of conservation must be made applicable to a period especially remote. Experience appears to have proven the desirability of such a policy in the case of forests. It is possible that it may prove to be necessary in the case of mines.

The improvement of the methods of utilization will avail little if the volume of result to be achieved is not curtailed. If social demand is allowed to increase by leaps and bounds, the most careful utilization may coincide with an enormous increase in the aggregate destruction of natural resources. At this point are encountered questions of population and of luxurious consumption. The wisdom of the nations will be none too great to deal with these phases of the problem.

Conservation is connected with some of the most difficult of the unsettled problems of economic theory. The preceding discussion has revealed in the background at least three old problems of economic science, — problems which ever reappear in one form or another as the basic difficulties in the determination of concrete policies. Briefly stated, they are: (1) What is the criterion of social value ? How may we compare the relative desirability of two social alternatives, such as the consumption of a commodity in the present or in the future ? (2) Shall organized society in collective action discount the future in the same manner and to the same extent as do individuals ? (3) Shall the direction of social policy be determined by national or cosmopolitan welfare ?

A recognition of the limitations of conservation and of its dependence upon the unsolved riddles of economic science does not discredit in the least the conservation movement. It has already been pointed out that there is much to be accomplished in the promotion of rational methods of utilization which do not conflict either with individual self-interest or with the present well-being of society. It has been shown, too, that conservation may be accomplished without seriously interfering with the self-interest of the producing classes. It may even be cause for satisfaction that the movement has swept beyond the original issue and is making possible the development of a more rational land policy. Meanwhile it remains for the economist to develop the theoretical basis upon which the solution of the ultimate problems of conservation must depend.

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